COMPUTERWORLD
JOURNAL

HEALTHCARE

A PACS PORTRAIT

SOME PROVIDERS WONDER WHETHER
PICTURE ARCHIVING AND COMMUNICATIONS SYSTEMS
WILL PAY OFF

contents

November 1997

NOTE TO READERS:

Regrettably, this is the final issue of *Healthcare Journal*. We'd like to thank our advisory board for their insightful guidance and our readers for their helpful feedback and unswerving support.

vitalsigns

Medical Information Bus Aids Bedside Data Collection

The standard integrates bedside device information and reduces hand-charting for more cost-effective patient care

BY SHARON WATSON

Medicine today often has a very high-tech look. Patients who are in intensive care units and operating rooms are surrounded by a bevy of electronic equipment — ventilators, infusion pumps, pulse oximeters, urimeters and anesthesia devices. However, these devices are usually from different manufacturers and don't share data easily. So the clinicians charged with monitoring bedside care devices become human data integrators, glancing at readings from one device before adjusting another.

That decidedly low-tech approach was not good enough for the Intermountain Healthcare System in Salt Lake City. Eight years ago, one of the system's hospitals, LDS Hospital, implemented an early version of the Medical Information Bus (MIB) standard in a 60-bed adult intensive care unit. The MIB, which automatically captures numeric and waveform data generated by bedside devices and routes it to a central controller, is used in intravenous pumps and was piloted in pulse oximeters and ventilators at LDS Hospital.

"Our experience with the IV pumps has been remarkable," said Reed Gardner, co-director of medical informatics at LDS Hospital as well as professor and chairman of medical informatics at the University of Utah. "Over 99% of the drip rate changes — a measure nurses would normally log on the chart — now come automatically out of the MIB," he said.

ANOTHER CONVERT

The experience led the healthcare system to use the formal IEEE 1073 MIB standard at McKay-Dee Hospital in Ogden, Utah. That hospital installed MIB boards in its intensive care unit IV pumps about 10 months ago and installed bedside controllers for each patient. MIB data is first collected at the controller, then travels to the hospital's patient record system via an Ethernet network.

McKay-Dee Hospital is capturing about 80% of the data automatically with the MIB — a falloff

from the LDS Hospital numbers that Gardner attributes to start-up snags while clinicians who are used to manually recording all data learn the new system. However, the early clinical results, which the hospital plans to publish in the near future, are strong enough that Intermountain has ordered IV pumps with built-in MIB capabilities for all of its 23 hospitals. As devices and monitors are upgraded, the system will require these to be MIB-compliant as well, Gardner said.

"MIB gives us more accurate data than humans do and in a more timely fashion," he said. For instance, the hospital has uncovered a large discrepancy between what the devices say happened and what humans hand-chart. "People may get busy doing something else, and they never log a particular change," Gardner said.

Many providers are just now beginning to realize the costs associated with such practices in acute care settings, said Bob Kennelly, chairman of the IEEE 1073 general committee and president of Acute Healthcare Solutions in Meredith, N.H., a vendor of software applications that analyze MIB data. "A few are starting to understand that costs accrue in the operating room, intensive care and emergency departments

and want to re-engineer those operations," he said.

Kennelly and other MIB proponents said the MIB helps accomplish that by not only making real-time care more efficient but also enabling providers to store point-of-care data for retrospective review.

"With manual monitoring, you're taking snapshots, and so you don't really see the trends occurring in patient care," said Louis Costa, senior applications engineer at LinkTech, Inc. The Bohemia, N.Y.-based firm makes MIB chip sets for medical equipment manufacturers.

Gardner said he expects MIB data to be helpful in building clinical pathways but said the hospital must first determine what data to collect and how frequently. The key is to get a comprehensive clinical picture of the patient

would store 1.5 million bytes of data a day in the process. "So you say, 'Wait a minute, are we just dumping noise into the system?' " Gardner said. However, no one seems to have the answer yet, he added.

BUY-IN AN ISSUE
Another unanswered question, at least for some, is whether device manufacturers will embed MIB in their products. At least one leading patient monitor vendor thinks that will take a while. "No major vendors have plans to do MIB now or in their next-generation products," said Brian McAlpine, product manager at Hewlett-Packard Medical Products Group, which has introduced a proprietary interface engine product, Device Link, to take proprietary data streams from bedside devices into a single monitor.

embraced the standard. Yet he said Hewlett-Packard Medical does plan to eventually support the upper, data-definition layers of the MIB standard within Device Link, if not necessarily the physical transport layers. And others said MIB's adoption is inevitable.

"MIB is definitely the direction of the future," said Dave Garets, a research director at Gartner Group, Inc. in Stamford, Conn. He said MIB could become more common in medical devices in as few as three or four years if providers add MIB as they upgrade outdated firmware embedded in bedside devices to meet Year 2000 computing requirements. "If I were a CIO, I'd require all upgraded devices to be MIB-compliant," Garets said. "Otherwise, you'll have another wholesale upgrade to MIB in a few more years because

MIB is a very important technology for the computer-based patient record."

In addition to the Intermountain Healthcare System adopting MIB, the U.S. Department of Veterans Affairs is requiring embedded MIB interfaces in any new physiological monitoring equipment it acquires for the more than 150 hospitals it operates. The Veterans Affairs system cited the standard's open architecture and the resulting ability to plug and play bedside devices into hospital information systems as the key reasons for adopting MIB.

MIB fans said those are the features that will lead to business benefits providers need to thrive under managed care.

For instance, Costa said the MIB offers providers the ability to buy equipment from any vendor and have it interoperate and then use MIB data to create clinical pathways that help patients heal faster, thus reducing costs while improving care. "That's what hospitals need to come away with: the ability to provide better healthcare in a more cost-effective way," he said. ∎

> **"If I were a CIO, I'd require all upgraded devices to be MIB-compliant."**
> **DAVE GARETS**
> **GARTNER GROUP**
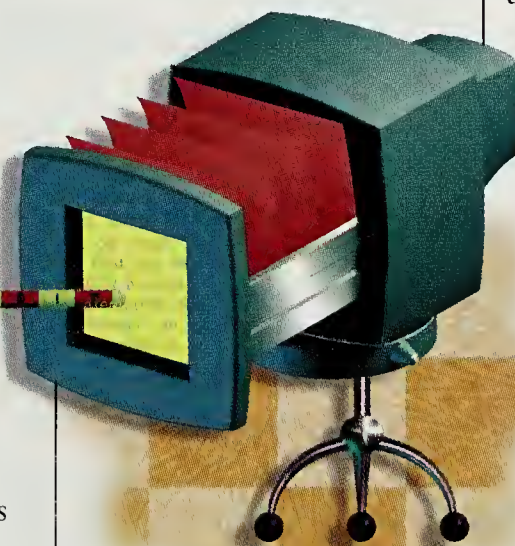
without overloading a repository.

For instance, he said the hospital could easily record 33 data parameters with every breath a patient takes on a ventilator, but that

McAlpine said vendors are concerned about the expense of adding MIB to their products — estimates vary from $90 to $400 per device — especially because providers don't seem to have

WATSON IS A FREELANCE WRITER IN CHICAGO SPECIALIZING IN HEALTHCARE AND TECHNOLOGY.

MORE AND MORE PROVIDERS ARE TURNING TOWARD PICTURE ARCHIVING AND COMMUNICATIONS SYSTEMS, OR PACS, TO MANAGE AND DISTRIBUTE DIGITAL PATIENT IMAGES, BUT SOME STILL ASK 'WILL PACS PAY OFF?'

BY SHARON WATSON

Hospital patients get their pictures taken a lot. These are rather unusual portraits, to be sure: moving ultrasounds of fetuses in the womb, electronic glimpses of a beating heart, digital cutaways of bodies and brains.

But while their film is in a different class from family snapshots that get stuffed into shoeboxes, radiologists in integrated delivery systems (IDN) face many of the same issues family photographers do: How should images be stored and organized? What's the best way to present them? How can they be distributed when and where they're needed?

Many radiology departments still file film folders and view these studies on lightboxes. Others, though, have turned to Picture Archiving and Communications Systems (PACS). A PACS is deceptively simple: It consists of modalities that generate images, a network for transmitting them, a database for storing them and workstations for viewing them.

For example, the PACS at the Hospital of the University of Pennsylvania in Philadelphia should be complete by the end of December, said Dr. Reuben Mezrich, the provider's interim chief of radiology and medical informatics director. The department will then be virtually filmless — a goal that's taken 15 years of planning and three or four years of implementation to reach, he said.

Magnetic resonance imaging (MRI), computed tomography (CT), ultrasound and computed radiography (CR), or filmless X-ray, machines in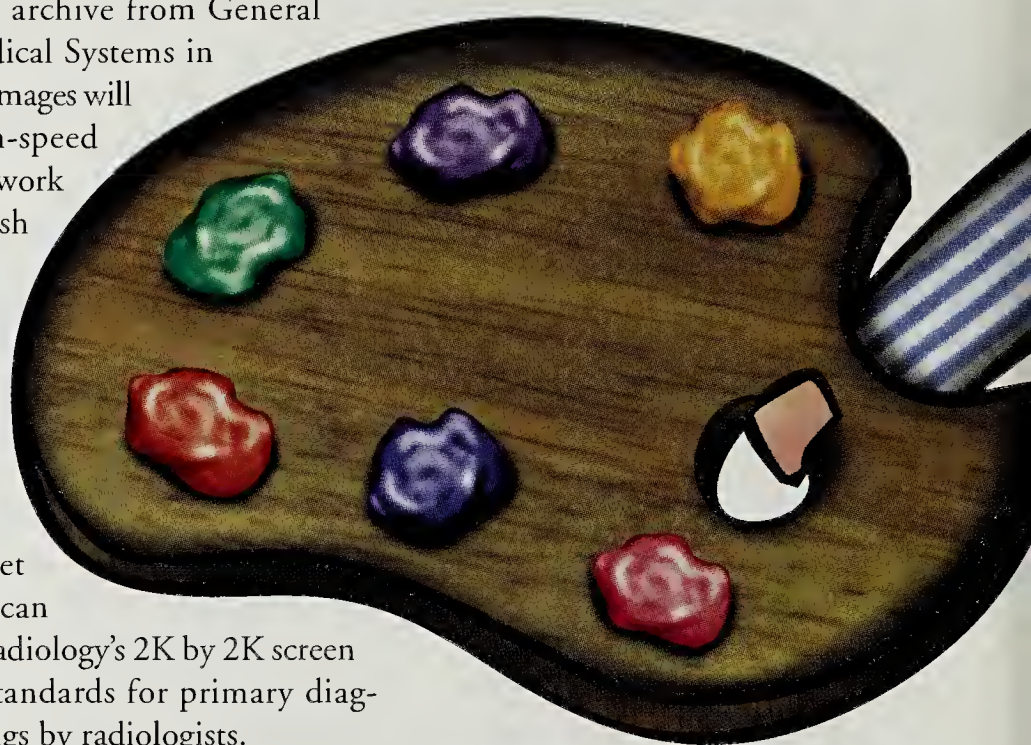 a variety of locations — from the radiology department to the emergency department to an outpatient clinic — will feed digital images to a Sun Microsystems, Inc. workstation-based image archive from General Electric Medical Systems in Milwaukee. Images will travel a high-speed Ethernet network to Macintosh and eventually Windows NT-based workstations with monitors that meet the American College of Radiology's 2K by 2K screen resolution standards for primary diagnostic readings by radiologists.

Physicians who don't require diagnostic-level image resolution can request slightly lower-resolution images delivered to them via their Microsoft Corp. or Netscape Communications Corp. Web browsers, courtesy of the hospital's intranet. Eventually, the department will digitally scan into the archive selected remaining film studies now stored in two libraries. Then, virtually all readings and consultations will be done with "soft" or electronic images, with film printed only as patients visit providers requiring hard copy.

The PACS archive should make it easier to find the historical studies radiologists and physicians need to compare against newer studies to gauge patient progress, Mezrich said. With physical films, too often the required study is "unavailable" — lost, misplaced or in transit, he said.

The PACS also makes it possible to send images over the hospital intranet at a physician's request, giving them information about their patients more quickly, which can lead to faster treatment and more satisfied patients, Mezrich said. "We're improving service," he explained.

Improved service so providers can compete for business from referring physicians, reduce costs and improve care — mainly in response to the growth of managed care — is a major reason why IDNs are starting to consider full-blown PACS, agree vedors, consultants and PACs users and prospects. "It's driven by radiology but also by chief operating officers looking for cost savings and efficiencies during mergers," said David Diamond, technical master at First Consulting Group in Boston.

In addition to improving service, the University of Pennsylvania PACS has cut "well over $1 million" from the film budget, Mezrich said. But most users and analysts say it's tough to justify a PACS investment on hard-dollar savings alone. "It's not clear that PACS save money," said Don Baune,

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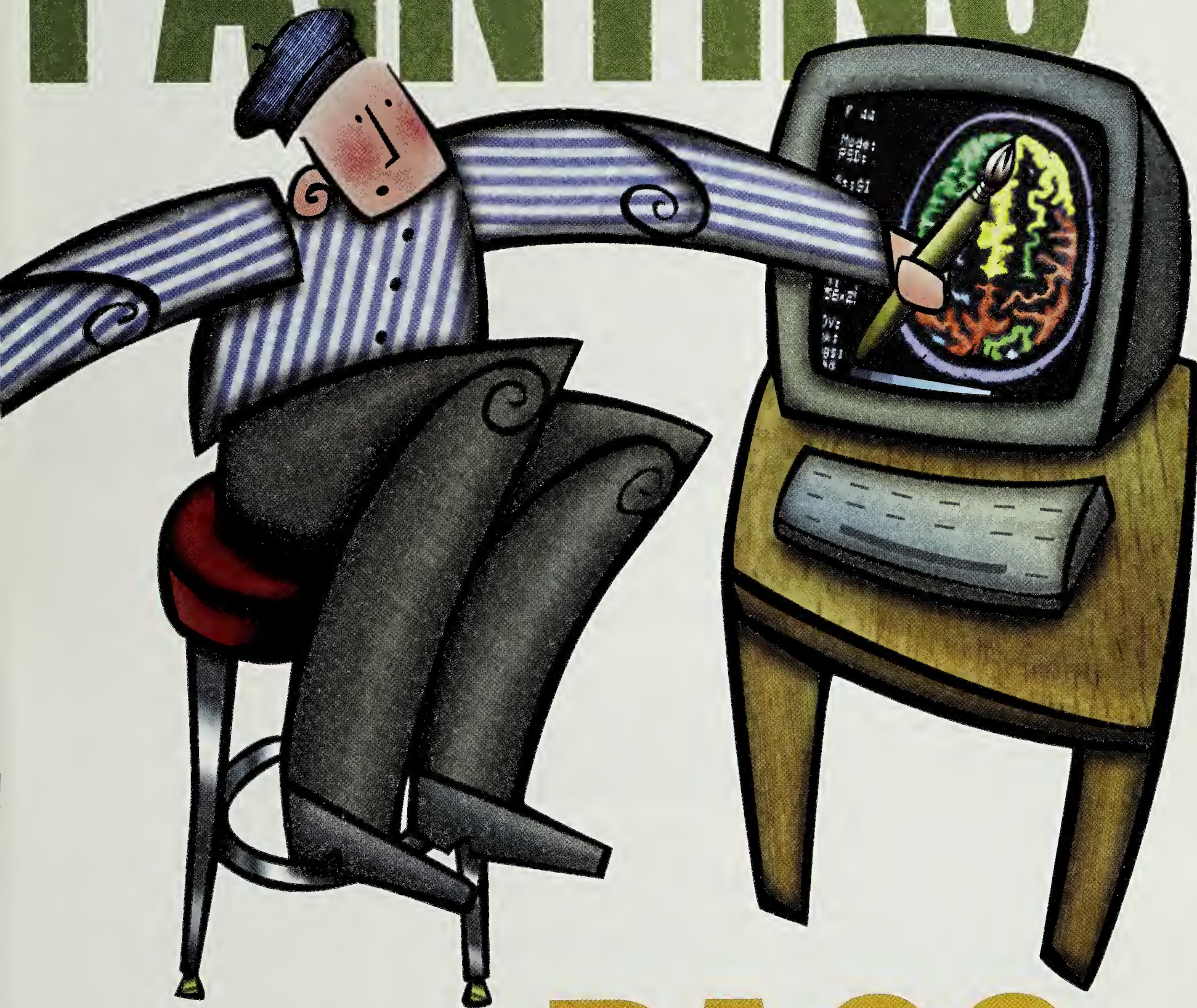
Picture-Perfect PACS

director of information technology at the University of Utah Health Sciences Center. He and other PACS users said typical hard dollar savings from reducing film and storage costs often get plowed back into the PACS. So increasingly, PACS's impact is felt in tougher-to-measure soft dollars.

"What is a reduction in cycle time worth? Does it affect length of stay? How much does that affect costs?" asked Dr. Fred Behlen, assistant professor of radiology and co-director of the PACS project at the University of Chicago Hospitals.

More providers want answers to these questions, vendors and consultants say, but they're hard to supply. "We tell clients we can do spreadsheets, but we'll get into some vague assessment numbers," Diamond said. For example, measures could be as minute as counting a film courier's footsteps.

PROMISES, PROMISES

While hard cost savings have been difficult to count, dollar figures for PACS investments have added up all too easily for many institutions. Until recently, the typical multimillion-dollar budget of the average PACS has kept the systems mainly within academic medical centers that could implement PACS as clinical or computer science research projects. Even a "mini-PACS" involving one modality with point-to-point connections, such as networking and archiving ultrasound images, can run close to seven figures, consultants said.

Plus, PACS haven't always lived up to their billing. "PACS have had a bad name," said Thomas Kennedy, global segment product manager for integrating imaging solutions at GE Medical Systems. "Technologies and capabilities were promised that couldn't be delivered."

But Kennedy, consultants and users say even without obvious hard dollar savings, several economic and technological factors have combined to make PACS more attractive to IDNs. First, many PACS component costs, including disk storage, network bandwidth and workstation technology, continue to fall. And Web-based technologies, such as those Mezrich's department uses, seem to be providing cost-effective means to distributing images throughout an IDN. "The capital costs of PACS have been very high, but they're coming way down," Diamond said.

In addition *to improving service, the PACS has cut "well over $1 million" from the film budget.*

REUBEN MEZRICH, THE HOSPITAL OF THE UNIVERSITY OF PENNSYLVANIA

Yet PACS are still far from cheap and simple to implement, as the Orlando Regional Healthcare System has found. This IDN, which includes six hospitals, several physician practices and various ambulatory care facilities in and around Orlando, Fla., has evaluated PACS technology several times in the past few years and each time has elected not to install, said Bruce Wacker, radiology systems manager for the provider.

"The magnitude of a PACS project is often misleading," he said. "You can't just look at going filmless; you must look at the repercussions of that decision, too."

Wacker said even mini-PACS installa-

tions raise large issues. For instance, the hospital considered going filmless in one of its ambulatory care centers. But two questions quickly came up: First, how large an image archive would the center need, and how could it be upgraded? Second, if not all of Orlando Regional's clinics were filmless, could the provider maintain and distribute both electronic and film-based images, somehow integrating the two? Wacker's conclusion: "You have to bite the bullet and take everything filmless at once, and that requires intestinal fortitude."

It also takes a lot of money, he said, because tossing out film entirely creates yet another problem: how to give physicians

outside radiology departments access to soft copy images. Printing film for their use eliminates costs savings, Wacker said. But the incremental costs of extending a PACS network to all physicians, especially off-campus referring physicians, are "astronomical," he said.

"Until there is low-cost or free access to images, PACS will be minimally successful," Wacker said. "Doctors can't keep running to radiology to sit at a workstation."

Other users agree that factoring network costs into a PACS budget can make it swell by millions of dollars. However, some providers say their institutions already have or are building high-bandwidth enterprise networks that their PACS can sit on. "We've been successful in having the network viewed as a utility," said Behlen at the University of Chicago Hospitals, which has an asynchronous transfer mode (ATM) network.

Also, some users and consultants say networking costs are coming down. Whereas ATM was once considered the choice network infrastructure for PACS, many users are now turning to less expensive 100M bit/sec. or 1G bit/sec. Ethernet, and PACS vendors are supporting this development, Diamond said.

PACS players also expect Web-based solutions to help reduce costs and increase image accessibility. The University of Pennsylvania solution enables physicians to use either Macintoshes or PCs, Mezrich said. Recent image studies are copied and stored on a Sun SPARCserver 10 Web server running Netscape's Navigator. Physicians click on an icon in their browser that pulls up the image study and the radiologist's dictated report. The 1K by 1K images are not considered diagnostic quality but amplify the report text, he said.

The University of Utah Health Sciences Center in Salt Lake City is experimenting with a Sun Java-based image server enabling about 25 referring physicians to access their patients' nuclear medicine and MRI images via the Internet, said Paul Christian, technical director for nuclear medicine at the center. The physicians are still evaluating the system, but it's possible that once Utah has finished installing its PACS archive, referring physicians at outlying clinics and partner hospitals as well as

physicians in the hospital but outside of radiology will be able to use the Java server to pull up images on any nearby PC, he said. That's much more cost-efficient than deploying $50,000 to $100,000 viewing stations to replace lightboxes throughout the hospital, Baune said.

THE DICOM DILEMMA

While emphasis today is on PACS's benefits to the enterprise, a PACS is still a department-based system. And users point out that radiologists are extremely efficient at reading film on lightboxes, so a poorly designed PACS workflow could actually slow them down. For PACS to make radiologists more efficient, all sources agree it's vital to integrate modalities, the image database, the radiology information system (RIS) and the viewing workstations. In the PACS world, that's done through the Digital Imaging and Communications in Medicine (DICOM) standard.

For the University of Utah Health Sciences Center, which is expanding several mini-PACS to an enterprise PACS, that meant upgrading MRI, CR and CT equipment to DICOM compliance via software, hardware and protocol conversion boxes. The provider also installed a HL7/DICOM conversion box from Mitra Imaging, Inc. on its RIS.

The protocol conversions enable the provider to translate HL7-compliant data from its RIS into the DICOM understood by the PACS and CR, Baune said. For instance, requests for radiological procedures are bar-coded, then scanned by modality technicians. The modalities then query the RIS for patient demographic data, which is then preloaded onto the image. This way modality technicians don't need to manually enter patient data, which can lead to filing error rates as high as 15% to 20% even with a PACS, according to Wayne DeJarnette, president and chief executive officer of DeJarnette Research Systems, Inc., a PACS integration firm in Towsin, Mass.

The integration among modalities, RIS and PACS also enables radiologists to use viewing workstations more efficiently through image prefetching. With prefetching, the RIS queries the image archive for the studies associated with patients on the RIS schedule. The archive then uploads, or prefetches, the required images to a workstation, as at the University of Utah Health Sciences Center, or to a short-term storage area — the solution at the University of Pennsylvania, which holds reports for about a month in a 256G-byte RAID server before they're sent to an optical jukebox for long-term storage.

"The only way to make effective use of the archive is to let the RIS do the work for you," said R. L. "Skip" Kennedy, information systems manager, radiology, at the Medical Center of the University of California at Davis. "Without a work list and prefetched images, you've crippled the radiologist," he said. With a PACS archive easily holding 30T to 40T or more bytes of data, Kennedy and other users said they've yet to find any image database able to keep up with a continual stream of hits from radiologists as they flip through studies.

Despite the consensus that such integration is key to PACS success, DICOM-compliant equipment is hardly plug and play, according to users and vendors. "To make a given connection can take one hour, or it may require a software engineer," Behlen said.

All agreed that DICOM is a tightly defined specification but that vendors may
*Please turn to next page*

Brief Images

ADVICE FROM PACS USERS:

- Map department workflow scenarios before choosing a PACS, then make sure the vendor is flexible enough to accommodate them.

- Be prepared to scrub data when integrating a RIS with a PACS. Chances are, modality and RIS patient demographic data won't match.

- Insist on having DICOM-compliant modalities, image archives and workstations. Charge vendors with making connections work.

- Spell out all details and responsibilities in vendor contracts. Make no assumptions about prices, features or functions.
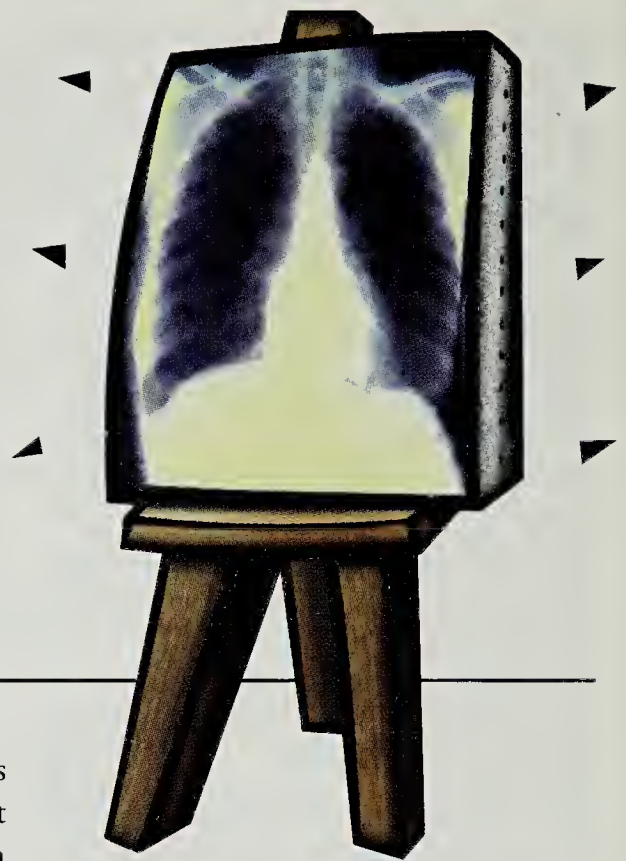
choose to implement only the portions of it that seem relevant to their specific product. So at Utah, the MRI exported DICOM objects but couldn't import them, and all DICOM wasn't intelligible to all workstations, Baune said.

Kennedy's staff at the University of California's medical center took on DICOM integration as a computer science challenge and developed its own Windows NT and SQL Server-based DICOM translation program. But he and other PACS users advised PACS prospects to make a single vendor responsible, in writing, for integrating all the PACS elements. What's not clear is who will bear the burden of integrating PACS data with the clinical data repositories and computerized patient records

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>
> ## BRUCE WACKER, ORLANDO REGIONAL HEALTHCARE SYSTEM

being built in many IDNs.

"You hope you'll get a record that speaks DICOM," Kennedy said. While most records vendors are more familiar with HL7 than with DICOM, the Andover Working Group, which has many patient records and Hospital Information System vendor members, is tightening the relationship between DICOM and HL7 by adding DICOM specifications to its Enterprise Communication Framework. The framework was designed to use popular healthcare object brokering middleware, such as Common Object Request Broker Architecture and Microsoft's Distributed Component Object Model, to make healthcare applications based on standards such as HL7 and DICOM easier to develop and integrate.

"More and more people are talking about browser-based electronic patient records," Diamond said. "So with plug-ins from vendors that support compression, that support DICOM retrieval — and these exist today — then you can do some very tight integration work at the desktop that assumes you have separate products running on the back end."

THE PACS PAYOFF
While most users said they can't calculate hard savings on their PACS investments, IDNs are slowly moving forward with PACS. The WCA Healthcare System in Jamestown, N.Y., recently issued a request for proposal for a PACS. The provider expects the PACS, when paired with a complementary teleradiology system, to provide better service to its referring physicians, new services to smaller clinics that can't afford their own radiology services and im-

proved patient care, said Murray "Skip" Marsh Jr., vice president of finance and chief financial officer for the provider.

"We don't have concrete benchmarks yet," Marsh said, but he expects to be held accountable for showing the PACS's added value in cutting costs, improving clinical quality and increasing community access to care.

While benefits such as those may be hard to measure, key PACS components are getting cheaper, making it more likely that other IDNs will take a second look at PACS price tags, users and vendors agreed. PACS users who have paid between $60,000 and $100,000 for diagnostic-quality Unix workstations said they're looking forward to using less expensive Windows NT solutions on high-end PCs. Most also said they want these to be multifunctional workstations that can access other hospital productivity applications, unlike most PACS workstations today, which are dedicated to image viewing only. Less expensive but still powerful processors also make it more affordable to deploy secondary viewing stations, used for teaching or reviewing image studies.

In short, while PACS may not yet be picture-perfect, consultants say it's time to prepare for them. "If this isn't the year of the PACS, next year will be," Diamond said. "People need to start planning and architecting with PACS in mind." ∎

WATSON IS A FREELANCE WRITER IN CHICAGO SPECIALIZING IN HEALTHCARE AND TECHNOLOGY.

The Brave New World of

## Healthcare is pushing to move beyond its electronic data

Down in the trenches of healthcare electronic commerce, Christopher Williams describes what it often takes to connect a provider to Envoy-NEIC, his employer and the nation's largest clearinghouse for health insurance claims. "We usually have to analyze and develop a keyboard emulation scheme and a screen scraper as if our interface was one of their human claims processors," he said. "It's old stuff. You can't hire kids out of school to do it. They all want to build objects and Web sites."

Craig Muzilla might have been one of those "kids." He's Williams' counterpart at InStream Corp., a Burlington, Mass., company whose core solution is an open, flexible system for private IP networks that uses standard technology to transmit ASCII files of healthcare records between managed care organizations and providers — definitely not "old stuff." "In the old days, you had one transaction — a claim — and that was a one-way flow of information between the doctor and the payer," Muzilla said. "Now, because of managed care, you might have 15 different types of transactions that have to go back and forth."

Welcome to the brave new world of healthcare electronic commerce. Even as market forces for cost control, regulatory initiatives on cost and quality, and consumer demands for quality care and more flexibility in provider choice drive a massive shift toward managed care, healthcare's venerable electronic data interchange (EDI) marketplace is fast being transformed by dramatic increases in computing power, cascading innovations in communications and software technology, and the Internet. "Historically in healthcare, electronic commerce has been confined to more of EDI. It's been batch processing, and it's been financial data from the provider to the payer to speed claim processing," said Janice Young, an analyst at Gartner Group, Inc. "It's definitely broader than claims now — definitely broader than financial," she added.

Broader, and much more complicated, said Tim Breaux, an associate partner at Andersen Consulting. "What's complex about healthcare now is not just that it is a bunch of virtual enterprises but that most participants are in multiple concurrent virtual enterprises," he said.

John King, director of the Provider Technology Group at Blue Cross/Blue Shield of Massachusetts, the largest provider
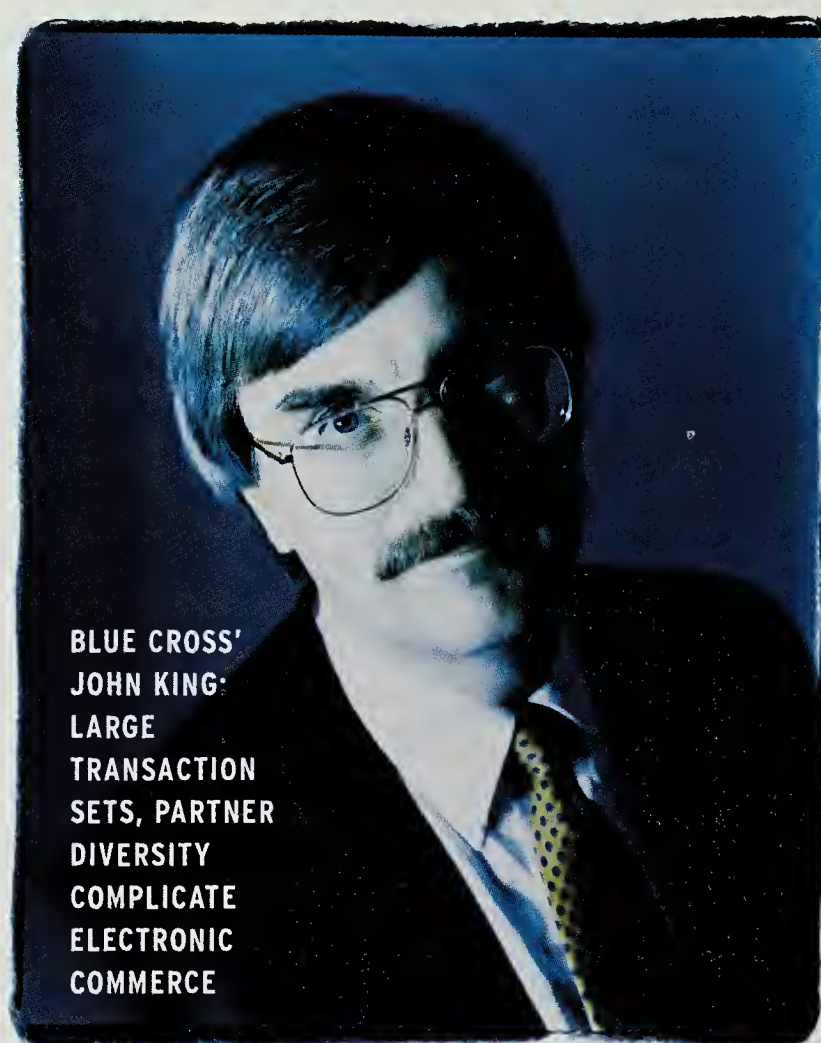
BLUE CROSS' JOHN KING: LARGE TRANSACTION SETS, PARTNER DIVERSITY COMPLICATE ELECTRONIC COMMERCE

of managed care services in New England, said healthcare electronic commerce's large data transaction sets, the wide range in size of its trading partners and disparate levels of user knowledge (from information technology specialists to clinicians) only add to its complexity.

At the same time, the pervasive restructuring of the industry has dramatically increased competition and incentives to install IT to cut costs. Blue Cross, for example, uses an automated network to process 95% of its managed care referrals and most of its member eligibility transactions. Of the company's 14,000 providers, 10,000 access the network in real time with credit-card swipe boxes, client/server PC setups or terminal emulation. Blue Cross made a point of first connecting high-volume providers with the most to gain from various cost savings afforded by the network. The

ELECTRONIC COMMERCE

interchange claims processing tradition   BY JOHN R. HOWE

result: The 71% of its providers that now use the network serve 80% of the company's 1.8 million members. Total savings from the network more than paid for its implementation in less than three years, King said.

Besides helping healthcare cut back on its paperwork, the new networks are streamlining patient utilization of provider space, facilitating integration of databases among trading partners and enabling two-way communication between providers and payers, all of which adds beef to the industry's bottom line, said Michael Eliastam, an associate partner at Andersen. And they go along nicely with healthcare's larger trend away from a supply-driven to a demand-driven "patient-centric" market, he added. "The only way to take out any more costs and to improve service is to satisfy people's needs rather than force them to match their needs to the supply side architecture," he said. Eliastam pointed to Healthdesk Online, a Berkeley, Calif., service that offers in-house health management through links to primary providers, electronic data transfer of test results, scheduling and reminder services, secure two-way messaging and access to healthcare content at a private Web site. Not only do more informed consumers lower costs by using provider services and facilities less often, but they also buy more healthcare products and services when they know what's good for them, Eliastam said.

Although healthcare electronic commerce is certainly adding market opportunities and enhancing competitiveness within the industry, widespread, seamless connectivity is still a long way away. Passage last year of the Health Insurance Portability and Accountability Act (see story page 8), with its call for national uniform standards for electronic transmission of healthcare information, has raised hopes that at least some of the logjams will be loosened, but industry insiders doubt they'll be effective without common implementation guidelines, while others say the law's implementation deadlines may be headed for a rude collision with data processing's dreaded Year 2000 problem.

Even without the current uncertainty over standards, healthcare faces an array of electronic commerce challenges, from coordinating its transition from paper to electronic transactions among various sectors to deciding who pays communications and database costs and who's liable for the veracity of information flowing through the new networks. Last but far from least are public concerns about the privacy of patient records, although industry analysts agree that most of those worries have more to do with misguided perceptions than facts and that any necessary solutions will come through improved policies and procedures, not technical fixes.

Andersen's Breaux said he also sees more than just technical challenges ahead for healthcare electronic commerce. "When we're trying to resolve the many-to-many relationships between trading partners, the key barrier to e-commerce isn't technical — it's spending time and money to gain critical mass to make the network have value for the business function," he said.

One solution is already evident in the hordes of "niche" businesses now appearing in the busy intersections where healthcare electronic commerce has traditionally bogged down. "To the extent that intermediaries crop up in the marketplace to handle some of the many-to-many complexity issues, it actually improves the business process by routing complexity through external trusted third parties," Breaux said. "That's the stuff that's substantially enabled by the Web." He cited as a prime example ChannelPoint, an IT software and services start-up in Colorado Springs that has a single Web-enabled front end, where insurance brokers that employers hire can review multiple bids from multiple healthcare plans, saving time and money for all concerned.

Meanwhile, back in the trenches, Envoy-NEIC's Williams isn't holding his breath waiting for this new era of healthcare electronic commerce to arrive. Although he predicted that providers would be conducting real-time eligibility transactions at Envoy-NEIC's pilot Web site by the first quarter of next year, he isn't quite ready to hang up his screen scraper.

"There will never come the day when every payer can certifiably and reliably deal with every provider in the world without a clearinghouse in between," he said confidently. He's thinking about the "kids" these days and all the fancy stuff they're doing on the 'net. "You want to get into Web design?" he asked. "First you have to hang some Sheetrock." ■

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Touting Telemedicine's Growing Role

Of 100 recent neurosurgical telemedicine consultations that Allegheny General Hospital reviewed, 33 patients did not require transfer to a tertiary facility, saving about $500,000.

BY DR. JULIAN BAILES

Telemedicine has rapidly evolved to occupy an important niche in U.S. healthcare delivery. With its beginnings primarily in radiographic interpretation (teleradiology), growth occurred as costs decreased and availability increased throughout hospital information systems. The development of telemedicine systems within all specialties undoubtedly has been spurred by and has paralleled the tremendous growth of the computer industry and medical information systems.

Since the early '90s, there has been a rapid proliferation of both interest in and deployment of telemedicine systems. Simultaneously, the telemedicine product service line responded to the industrial opportunity to contribute to a burgeoning field within medicine. And managed care incentives to provide accessible and affordable healthcare to all Americans made the deployment of telemedicine systems linking rural and urban centers desirable.

Increased federal funding provided additional impetus. Many state and federal agencies have shown interest in the financial and technological resources to build modern telemedicine networks.

Neurological surgery was a relatively late participant in telemedicine, despite practitioner interest. It is an image-dependent specialty, requiring the review and interpretation of radiographic studies prior to surgical intervention on the brain or spine. Traditionally, the decision-making process regarding the transfer of a patient to a tertiary center for neurological treatment has been based on a phone call. This can result in film misinterpretation, patient mismanagement and patients being transferred to a referral center. Excessive medical expenses are often incurred.

Yet existing technology can make specialty medical care available to the rural population to improve the accuracy of diagnosis and the quality of patient management. Simultaneously, there is an increase in the appropriateness of patient transfer.

It became obvious that an existing, low-technology hardware and communications system could be developed and deployed to make neurological surgical specialty care available to a regional rural U.S. population. At Allegheny General Hospital in Pittsburgh, the Neurolink network is comprised of 20 domestic and six international sites connected to a central receiving station via ordinary, nondedicated, analog public telephone lines. This forms a teleradiology network specialized to expedite emergency neurosurgery consultations.

Allegheny recently reviewed 100 consecutive neurosurgical telemedicine consultations. The differential between tertiary and primary (rural) hospitals was calculated as cost savings on average length of stay, patient bed costs and transportation charges. Of the 100 consultations, 33 patients did not require transfer to a tertiary facility, saving an estimated $500,000.

Patients who do require neurosurgical intervention or intensive care can be expedited by implementing this basic telemedicine system. Traditional methods of patient triage and transfer often squander time as emergency departments reevaluate patients, neurosurgeons travel to review radiographic studies, and operating room personnel are only subsequently summoned. With telemedicine, previewing imaging studies allows time to assemble the operating room team, enabling the transferred patient to go directly from the helicopter landing zone to a waiting neurosurgical operating theater.

Telemedicine is here to stay. In this decade, it is becoming accepted by multiple factions within the medical community and managed care organizations. The ability to place any medical information in digital format and E-mail it as an attachment will make message management systems the common platform, and we will have "Web medicine." ∎

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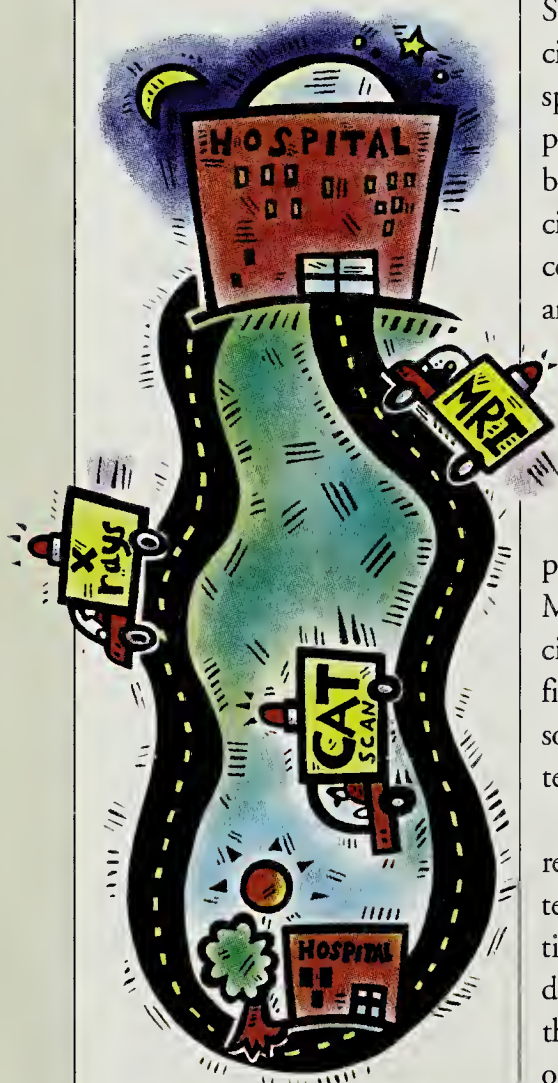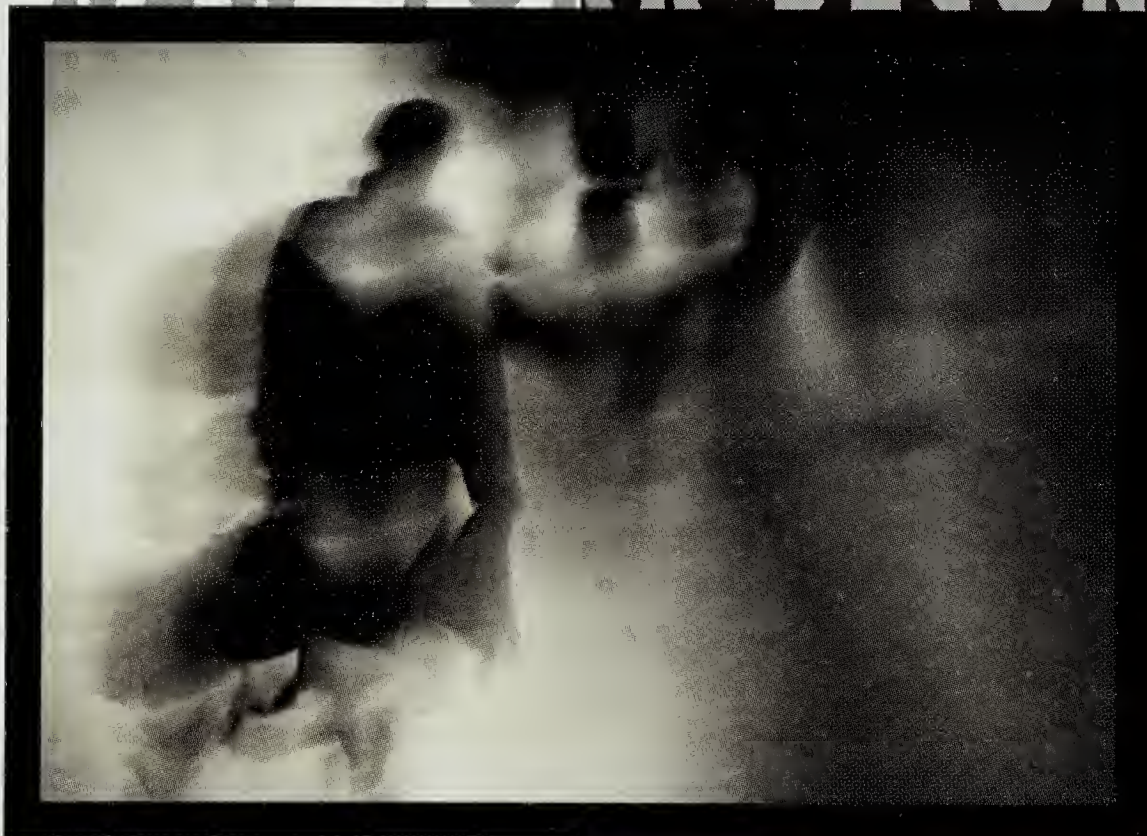
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